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# *Local Area Networking at 10Gb and Beyond*

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# Introduction

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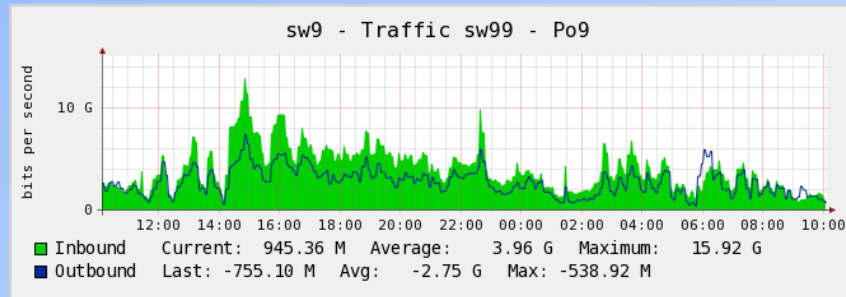
The intent of this presentation is to give an overview of how BNL has met the challenge of providing end-to-end throughput beyond 10Gbps.

# Operational Requirements

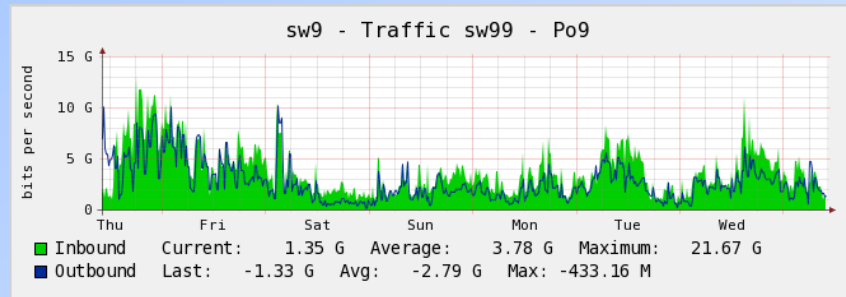
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- Accommodate large-scale data transfers.
  - BNL is Tier1 site for USATLAS.
- Keep pace with growing numbers of (racks of) servers.
- Provide capacity for 10-Gig-attached storage systems.
- Provision links for inter-switch traffic.

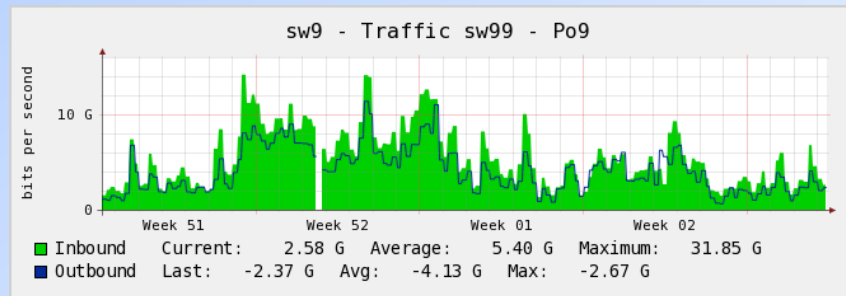
# Cacti Graphs (Inter-Switch Link)



Daily



Weekly



Monthly

# Challenges

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- IDS/IPS Technologies
- Firewall Technologies
- High-speed Interfaces

# IDS/IPS Technology

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What are we doing now for high-speed networks?

- For RHIC and ATLAS we export NetFlow to collectors for analysis.
  - The analyzer profiles internal behavior, like protocols, ports, addresses, etc.
  - Deviation from that behavior result in alerts and the possibility of being blocked.

# IDS/IPS Technology (cont'd)

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What are we planning to do?

We plan to continue the current strategy until more cost effective solutions become available.

# Firewall Technology

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What do we do now?

- Categorize RHIC/ATLAS traffic into 2 groups.
  - High bandwidth traffic (3Gbps or larger).
  - Low bandwidth traffic (up to 3Gbps).



# High Bandwidth Traffic

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- These network flows bypass the firewalls.
  - Tight access controls (ACL's) on the routers and hosts.

# Low Bandwidth Traffic

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- These network flows are inside a pair of FireWall Service Module (FWSM's).
  - These modules are limited in that the effective throughput is between 3 and 4 Gbps.
    - No more than 1Gbps for a single stream.

# Firewall Technology Moving Forward

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- Firewall technology has historically lagged behind the fastest commercially available network interface.
  - High Bandwidth Traffic
    - No change.
  - Low Bandwidth Traffic
    - Install ASA5580's for RHIC and ATLAS.
      - 10Gbps cable appliance.
      - Not limited to a 1Gbps ceiling on a single stream.

# High-speed Interfaces

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What are we doing now?

- Etherchannel (or Link Aggregation)
  - Inter-switch links are between 40-60Gbps links.

# Pros & Cons

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## ■ Pros to EtherChannel

- Resilience
- Cost effective
- Simple to Configure

## ■ Cons to EtherChannel

- “Path Selection Algorithm”
- Real Estate
  - Many Interfaces
  - Many Fibers

# High-speed Interfaces

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What are we planning to do?

- 100Gbps.
  - When available.

# Network Services

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## Questions/Comments

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